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Potent antimicrobial activity of *Rhizophora mucronata*

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Abstract
The antimicrobial activity of n-hexane, chloroform and methanol extracts of leaves and roots of the plant *Rhizophora mucronata* were studied. Ampicillin and clotrimazole were used as standard antibacterial and antifungal agents respectively. The result of the study revealed that the n-hexane extract and chloroform extract of leaves exhibited strong inhibitory action against *Bacillus subtilis, Staphylococcus aureus, Candida albicans, Aspergillus fumigatus* and *Aspergillus niger* and moderate inhibitory action against *Pseudomonas aeruginosa* and *Proteus vulgaris.* The rest of the extracts showed good inhibitory activity.

Keywords: *Rhizophora mucronata*, Agar disc diffusion method, mangroves, antimicrobial activity.

Rhizophora mucronata (family of Rhizophoraceae) commonly known as Asiatic mangrove, widely distributed along the coastal tropical and subtropical region has been reported to posses several medicinal properties. In countries like Burma, India and China bark of Rhizophora mucronata has been used as traditional medicine in the treatment of diarrhea, dysentery, blood in urine, fever, angina, diabetes, hematuria, and hemorrhage (Duke and Wain, 1981). Leaves are poulticed onto armored fish injuries (Watt and Breyer-Brandwijk, 1962).Indochinese use the roots for angina and hemorrhage. Malayans use old leaves and/or roots for childbirth. Burmese use the bark for bloody urine, Chinese and Japanese for diarrhea, Indochinese for angina (Perry, 1980). The present study was aimed at the preliminary investigation of antibacterial and antifungal activity of n-hexane, chloroform and methanol extracts of leaves and roots of *Rhizophora mucronata.*

Rhizophora mucronata (Family: Rhizophoraceae) was collected from mangroves forest of *Mangalore, west coast of India (Lat. 12o 52'N. Long. 074o 53'E).*during January 2010 and identified by a systemic Botanist. (Figure 1)

The *in vitro* antibacterial and antifungal studies of the n-hexane, chloroform and methanol extracts of the leaves and roots were carried out by the Agar disc diffussion method. (Barry AL.1976) All the extracts were separately dissolved in dimethylsulfoxide (DMSO) to get 10 mg/ml solutions. Ampicillin (1 mg/ml) and clotrimazole (1 mg/ml) were used as standard antibacterial and antifungal agents respectively. The antibacterial activity was evaluated by employing 24 h cultures of *Bacillus subtilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Proteus vulgaris* using Muller Hinton Agar medium. Antifungal activity was carried out against 24 h cultures of *Candida albicans* , *Aspergillus fumigatus* and *Aspergillus niger* using Sabouraud dextrose agar medium. Accurately 0.2 ml of the test and standard solutions were transferred to cups aseptically and labeled accordingly. The microorganism inoculated plates were then maintained at room temperature for 2 h to allow the diffusion of the solutions into the medium. The-Petri dishes used for antibacterial screening were incubated at 37±1° for 24 h, while those used for antifungal activity were incubated at 28±1° for 48 h. The diameters of zone of inhibition surrounding each of the wells were recorded. (Figure 2)

Fig 1. *Rhizophora mucronata* Plant with flower

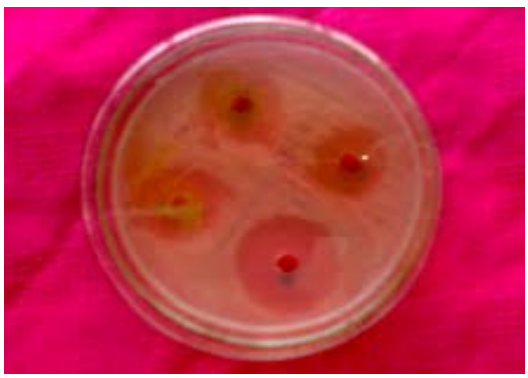

Fig 2. Antibacterial activity of *Rhizophora mucronata* extract against pathogen

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Table 1 enumerates the antibacterial and antifungal activity of the extracts of different parts of the *Rhizophora mucronata* . The n-hexane, chloroform and methanol extracts of the different parts of the plant exhibited strong to moderate activity against the test microorganisms. The results revealed that, the n-hexane and chloroform extracts of leaves exhibited strong inhibitory action against *Bacillus subtilis*, *Staphylococcus aureus*, *Candida albicans*, *Aspergillus fumigatus* and *Aspergillus niger* and moderate inhibitory action against *Pseudomonas aeruginosa* and *Proteus vulgaris*. The rest of the extracts showed moderate activity.

Table 1. Antimicrobial activity of *Rhizophora mucronata*

Test Organisms	Zone of Inhibition in mm					
	n-Hexane Extract*		Methanol Extract*		Chloroform Extract*	
	Leaves	Roots	Leaves	Roots	Leaves	Roots
B.subtilis	20	20	18	16	20	16
S.aureus	19	16	16	14	22	20
P.aeruginosa	21	19	14	16	22	20
P.vulgaris	20	17	18	16	18	14
C.albicans	21	16	17	14	20	18
A.fumigatus	18	17	18	12	22	14
A.niger	20	18	16	14	22	18

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